DOCUMENT RESUME

ED 099 625 CE 002 721

AUTHOR	Marquardt, Lloyd D.; McCormick, Ernest J.
TITLE	The Job Dimensions Underlying the Job Elements of the Position Analysis Questionnaire (PAQ) (Form B). Report No. 4.
INSTITUTION	Purdue Univ., Lafayette, Ind. Occupational Research Center.
SPONS AGENCY	Office of Naval Research, Washington, D.C. Personnel and Training Research Programs Office.
PUB DATE	Jun 74
NOTE	48p.; For related document see CE 002 722
EDRS PRICE	MF-$0.75 HC-$1.85 PLUS POSTAGE
DESCRIPTORS	*Job Analysis; Questionnaires; *Statistical Studies; Tables (Data)
IDENTIFIERS	Job Dimensions; PAQ; *Position Analysis Questionnaire

ABSTRACT

This study was concerned with the identification of the job dimension underlying the job elements of the Position Analysis Questionnaire (PAQ), Form B. The PAQ is a structured job analysis instrument consisting of 187 worker-oriented job elements which are divided into six a priori major divisions. The statistical procedure of principal components analysis was used to identify the job dimensions of the PAQ. Forty-five job dimensions were identified through eight separate component analyses of a sample of 3,700 PAQ analyses which had been stratified roughly in proportion to the occupational composition of the American labor force. These job dimensions accounted for a substantial portion of the variance associated with the data, the percentage ranging from 51 percent to 63 percent for the several component analyses performed. The 45 job dimensions which were identified might be viewed as representing groups of job elements which tend to occur together on jobs, and, since the sample on which these analyses were performed was stratified in proportion to the occupational composition of the labor force, these job dimensions would be relatively representative of the groupings of such job characteristics of jobs in general. (Author)

ED 099625

THE JOB DIMENSIONS UNDERLYING THE JOB ELEMENTS OF THE POSITION ANALYSIS QUESTIONNAIRE (PAQ) (FORM B)

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and

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Prepared for:

Personnel and Training Research Programs
Psychological Sciences Division
Office of Naval Research

Contractor:

Purdue Research Foundation
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Contract No. N00014-67-A-0226-0016
Contract Authority Identification Number, NR 151-331

Report No. 4

June 1974

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CE 002 721

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER 4	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) THE JOB DIMENSIONS UNDERLYING THE JOB ELEMENTS OF THE POSITION ANALYSIS QUESTIONNAIRE (PAQ) (FORM B)		5. TYPE OF REPORT & PERIOD COVERED Final Technical Report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Lloyd D. Marquardt and Ernest J. McCormick		8. CONTRACT OR GRANT NUMBER(s) N00014-67-A-0016
9. PERFORMING ORGANIZATION NAME AND ADDRESS Occupational Research Center Department of Psychological Sciences Purdue University, West Lafayette, IN 47907		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS NR 151-331
11. CONTROLLING OFFICE NAME AND ADDRESS Personnel and Training Research Programs Office of Naval Research Arlington, Virginia 22217		12. REPORT DATE June, 1974 13. NUMBER OF PAGES 39
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Not applicable

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Job dimensions
Job analysis
Position Analysis Questionnaire (PAQ)
Principal components analysis

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This study was concerned with the identification of the job dimension underlying the job elements of the Position Analysis Questionnaire (PAQ), Form B. The PAQ is a structured job analysis instrument consisting of 187 worker-oriented job elements which are divided into six a priori major divisions. The statistical procedure of principal components analysis was used to identify the job dimensions of the PAQ. Forty-five job dimensions were identified through 8 separate component analyses

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Block Number 19
Worker-Oriented job variables
Job Activities

Block Number 20

of a sample of 3700 PAQ analyses which had been stratified roughly in proportion to the occupational composition of the American labor force. Thirty-one of these dimensions resulted from 7 independent analyses using, in each case, only the job elements from one of the major divisions of the PAQ. The remaining 14 dimensions resulted from an overall analysis in which all of the PAQ job elements were used simultaneously. These job dimensions accounted for a substantial portion of the variance associated with the data, the percentage ranging from 51% to 63% for the several component analyses performed. The 45 job dimensions which were identified might be viewed as representing groups of job elements which tend to occur together on jobs, and, since the sample upon which these analyses were performed was stratified in proportion to the occupational composition of the labor force, these job dimensions would be relatively representative of the groupings of such job characteristics of jobs in general. Since previous work with the PAQ has shown that job dimensions derived from PAQ-based data do have some practical utility for solving various personnel type problems in organizations, it is expected that the job dimensions identified in the present study will also prove to be of practical utility.

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INTRODUCTION

Industrial psychology deals in part with the psychological aspects of the world of human work. Implicit in this area of industrial psychology is the assumption that the information being dealt with is in some way job-related, and that, thus, the characteristics of the jobs in question are either known or may be determined. Unfortunately, however, such job-related information has, in the past, tended to be more "qualitative" than "quantitative" in nature (McCormick, Jeanneret, and Mecham, 1972).

There have, however, been a few significant efforts in the area of job analysis which run counter to this trend. Notable among these exceptions are: the work of Viteles (1922, 1932) with the Job Psychograph; the development of the J-Coefficient by Primoff, (1957, 1959); the work of the U.S. Training and Employment Service in the development of the Worker Characteristics Form (Stead and Shartle, 1940), in the factor analysis of job analytic data (McCormick, Finn, and Scheips, 1957; Jaspen, 1949), and in the comparison of job analytic data obtained either from direct observations of jobs or from written job descriptions (Trattner Fine, and Kubis, 1955); and some of the work performed by the Personnel Division of the Air Force Human Resources Laboratory in the development and use of job inventories (Morsh, 1964; Morsh and Christal, 1966).

The present study is also based on a quantitative approach to the analysis of jobs, and is a continuation of a line of research pursued by E.J. McCormick and his students over the past decade or so. A summary of the previous research may be found in a Technical Report prepared by McCormick, Jeanneret, Mecham (1969).

The Position Analysis Questionnaire (PAQ)

The basic job analysis questionnaire used in the study was Form B of the Position Analysis Questionnaire (PAQ), a structured job analysis instrument consisting of 187 job elements of a "worker-oriented" nature, that was developed by McCormick, Jeanneret, and Mecham (1969). The 187 job elements of the PAQ are divided into six a priori major divisions (Information Input, Mental Processes, Work Output, Relationships With Other Persons, Job Context, and Other Job Characteristics). An appropriate rating scale (e.g., Extent of Use, Amount of Time, Importance to the Job, Applicability, etc.) is used by analysts when rating each of the job elements in relation to any given job.

Previous Research with the Position Analysis Questionnaire (PAQ)

After the initial development of Form A of the PAQ, a major research effort was undertaken by McCormick and his students to study the characteristics of jobs resulting from the use of PAQ-based data for various personnel functions in organizations. This effort first resulted in the development of a data pool consisting of PAQ analyses of 536

different jobs, these jobs differing both in terms of job context and job level. These data were then subjected to a series of principal components analyses which resulted in the identification of 32 job dimensions, 5 of which resulted from an analysis of all of the job elements taken together, and the remaining 27 of which resulted from a series of six PAQ divisions (Jeanneret and McCormick, 1969).

Job dimension scores (actually component scores) for each of the 32 dimensions and 536 jobs in the sample were then determined, and these job dimension scores were used as the basis for determining the extent to which PAQ-based data were predictive of certain potentially relevant criteria. In one such analysis, PAQ job dimension scores were used as the basis for the establishment of the aptitude requirements of various jobs (Mecham and McCormick, 1969b). In another such analysis, PAQ job dimension scores were used to predict the compensation rates associated with various jobs (Mecham and McCormick, 1969a). Both of these sets of analyses indicated that PAQ-based data were of some utility in the prediction of criteria of relevance to organizations. Several other major studies using PAQ based data have also been performed, some of them relatively recently, but since these studies are not of direct relevance to the present effort they will not be reviewed here. The previous research effort also resulted in the development of Form B of the PAQ, the form of the instrument which was used in the present study. Form B of the PAQ is reasonably similar to Form A, the primary differences between the two consisting of the addition, deletion, and modification of certain of the job elements, and of certain changes in the rating scales used.

Purpose and Scope of the Present Study

As stated previously, this study was a continuation of a line of job analytic research pursued over the past decade or so. The major hypothesis that has guided this research is that there is an identifiable structure to the world of human work, and that this structure can be of utility for various personnel functions. This hypothesis was tested with PAQ-based data in the previous research (Jeanneret and McCormick, 1969), and was generally confirmed, but the previous study was based on a much smaller sample of jobs than that used in the present study. The previous study also used data based on Form A of the PAQ, the predecessor to the present Form B of the instrument.

The present study was then concerned with the identification of the dimensions underlying the job elements of Form B of the PAQ. Due primarily to the fact that the present study was based on a much larger sample than has been used before, the present study should result in the identification of more stable, representative job dimensions than those found in the past. The statistical procedure of principal components analysis was employed in the present study to identify the job dimensions underlying the PAQ.

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PROCEDURE

Selection of the Sample

The sample of jobs used in this study was selected from a data pool consisting of over 8,000 PAQ analyses which had been gathered over a four year period. These analyses were obtained from approximately 125 different organizations. Since most of the jobs for which PAQ analyses were available had been identified with a nine-digit Dictionary of Occupational Titles (D.O.T.) code number, the occupational composition of the data pool was first determined by calculating the percentage of jobs falling into each of the ten major occupational categories delineated by the first digit of the D.O.T. number.

Next, data reflecting the numbers and percentage of people in the American labor force working in each of the ten major occupational categories were obtained from the 1970 Census of Population (U.S. Department of Commerce, 1970). When the numbers of PAQ analyses in the data pool were compared with employment in corresponding jobs in the labor force, it was found that the data pool was over-represented in certain major occupational categories, and under-represented in others. Since the final sample was to be stratified to match roughly the occupational composition of the labor force, it was therefore necessary to eliminate certain of the analyses from the data pool.

The first step in this elimination process dealt with those instances in which there were multiple analyses in the same organization which had the same job title and D.O.T. number. In the case of certain types of jobs (e.g., clerk typist, computer programmer) certain organizations had submitted a number of PAQ analyses for the same job, these analyses having been performed for different job incumbents. Since cases had to be eliminated in order to stratify the sample, it was reasoned that such multiple analyses should be dropped first, rather than randomly eliminating cases only on the basis of D.O.T. number. In particular, all such multiple analyses in excess of three were eliminated. Further, in those major occupational categories where the percentages in the sample were still high as compared to the labor force, additional multiple analyses were randomly eliminated; in the case of multiple analyses of some jobs this resulted in the inclusion of only a single analysis in the sample. The percentages of jobs in each of the major occupational categories were again computed at this point, and, where these percentages were still high, cases were randomly eliminated under the restriction that no D.O.T. number be eliminated entirely.

Finally, since the major occupational category with the first D.O.T. digit of "2" contains both clerical and sales types of jobs, the sample percentage for each of these sub-categories (as distinguished by using the first two D.O.T. digits) were treated separately. It was felt necessary to do so in this case as the original data pool was over-represented in terms of clerical jobs, and under-represented in terms of sales jobs. Had these two categories not been treated separately, the final sample would seem to match the population characteristics for this major occupational category, but, in reality, would have been under-represented for sales types of jobs and over-represented for clerical types of jobs.

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The final sample consisted of 3700 PAQ analyses, and was stratified to approximate roughly the occupational composition of the labor force. The proportion of analyses in this sample that fell within each of the ten major occupational categories, and the corresponding labor force proportions, are reported in Table 1.

In the final sample certain categories (especially 3 and 4) were still under-represented because of limitations of numbers of analyses in the data pool. On the other hand, the sample was somewhat over-represented with manual jobs (especially categories 5,6, and 7). Because of the relative importance of such jobs in the economy (despite their relatively low percentages in the labor force) it was felt that under-representation of certain categories should be "made up" with these categories of manual jobs.

Component Analyses Performed

As indicated earlier, the PAQ consists of six separate divisions dealing with various aspects of jobs (Information Input, Mental Processes, Work Output, Relationships with Other Persons, Job Context, and Other Job Characteristics). These divisions are of an *a priori* nature, in that the various job elements which comprise the questionnaire were originally divided into these divisions to reflect the fact that jobs consist of various phases, and take place in various environments. In cognizance of this structure found in the PAQ, separate analyses were performed for the job elements within each of the PAQ divisions. Thus, the particular job elements used in any particular analysis were those found in only one of the PAQ divisions.

The first five component analyses performed in this study were performed using, independently, the job elements in the first five divisions of the PAQ. Thus, the first analysis used only the job elements in Division #1 of the PAQ (job elements 1-35); the second analysis used only the job elements in Division #2 of the PAQ (job elements 36-49); etc. Two separate analyses were performed for the job elements within Division #6--Other Job Characteristics—since this section contained a group of job elements which were dichotomous rather than interval in nature. Separate analyses were, therefore, performed on the dichotomous and non-dichotomous job elements. Finally, the last component analysis performed was carried out with all of the PAQ job elements taken together. (For simplicity, the first seven component analyses described above are termed "divisional" analyses, due to the fact that in each of the analyses only the job elements from one of the six PAQ divisions were used. The final analysis, that using all of the PAQ job elements taken together, was an "overall" or "general" analysis.) It should be noted here that job elements 188-194, which deal with pay/income, and job elements 44,60,127, and 181, which are open-ended in nature, were eliminated from all of the analyses. Thus, a total of 184 job elements were used in various combinations for these analyses.

All of the eight analyses performed employed principal components solutions followed by Varimax rotations. The diagonal elements in the correlation matrices were set at 1.0, and a restriction was imposed that

the extraction of components terminate when the eigenvalue became less than 1.0. All of the analyses performed were traditional R-type principal components analyses.

Table 1

Occupational Composition of the Labor Force
and of the Base Sample of 3700 Jobs

Occupational Category and Dictionary of Occupational Titles Code	Number of People in Labor Force	Percentage of Labor Force[1]	Number of Jobs in Sample	Percentage of Jobs in Sample
0, 1 Professional, Technical, and Managerial Occupations	18,741,331	24.40 %	965	26.08 %
2 Clerical and Sales Occupations	19,332,175	25.17 %	729	19.70 %
20-24 Clerical Occupations	12,984,118	16.91 %	656	17.73 %
25-29 Sales Occupations	6,348,057	8.27 %	73	1.97 %
3 Service Occupations	10,066,302	13.11 %	281	7.60 %
4 Farming, Fishery, Forestry, And Related Occupations	2,765,865	3.60 %	61	1.65 %
5 Processing Occupations	1, 826,868	2.38 %	172	4.65 %
6 Machine Trades Occupations	5,480,130	7.14 %	493	13.32 %
7 Bench Work Occupations	4,080,413	5.31 %	361	9.76 %
8 Structural Work Occupations	6,285,192	8.18 %	329	8.89 %
9 Miscellaneous Occupations	7,822,507	10.19 %	309	8.35 %

[1]Labor force figures obtained from 1970 Census of Population. All percentages were computed on the basis of the 76,805,171 workers classified by the Census, although only 76,400,783 of these workers were matched with D.O.T. classification codes.

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RESULTS

Identification Scheme for Job Dimensions

An identification scheme used to assign a unique alphanumeric label to each job dimension was developed previously by Marquardt and McCormick (1973) for use with job dimensions derived from attribute profile data based on the PAQ. This identification scheme contained provision for identifying the job dimensions derived in the present study, so it was used with the dimensions reported herein.

The alphanumeric label used to identify each of the job dimensions is made up of three distinct parts. The first character of the label is the letter "J" for all of the job dimensions reported in this study, and is the letter "A" for all of the job dimensions based on attribute profile data which were identified by Marquardt and McCormick (1973). The letter "J" in this case stands for job data, while the letter "A" stands for attribute data. The second character of the alphanumeric label, in the case of dimensions resulting from the component analysis of the job elements whithin a given PAQ division, is a number from 1 to 6, denoting which of the six PAQ divisions were used to derive the given dimension. This is the case for the dimensions resulting from both the job data and the attribute profile data. In the case of the dimensions resulting from the component analysis based on all of the job elements in the PAQ taken simultaneously (the overall or general analysis), the second character of the alphanumeric label is the letter "G", standing for "General." Finally, the last character of the alphanumeric label is a number which denotes the dimension itself. In the case of dimensions which resulted from the component analyses of the job elements within each of the PAQ divisions, this number starts with 1 for the first dimension of the first PAQ division, and ends with 31, which was the last dimension derived from PAQ division 6 in the present study. This number ends with 23 for the job dimensions based on attribute profile data. In the case of the "General" dimensions which resulted from the overall analysis which employed all of the PAQ job elements, this number again starts with 1 for the first dimension, and ends with 14, which was the last General dimension identified in this study. A summary table (Table No. 10) of this classification scheme is given at the end of the results section.

Components Resulting from the Analysis of the Job Elements in PAQ Division 1--Information Input

The principal components solution of the 35 job element correlation matrix computed using the job elements in the Information Input division of the PAQ (job elements 1-35) yielded a total of 5 principal components which accounted for 52% of the variance. (More than this number of components were actually derived in this and the other component analyses reported in this section. However, an iterative rotation procedure was used in conjunction with these analyses, and the number of factors chosen for use was not always the total number of factors extracted.) The job elements receiving substantial loadings on these dimensions are reported in Table 2. The interpretations associated with the various dimensions reported in Table 2 are given below.

Table 2

Job Dimensions Based on Component Analysis of Job Analysis Data: PAQ Division 1--Information Input

	Job Dimensions	Rotated Loading[a]
Dimension J1-1: Perceptual Interpretation		
24	Sound pattern Recognition	82
16	Nonverbal sounds	78
25	Sound differentiation	76
5	Visual displays	66
18	Odor	60
28	Estimating speed of moving parts	58
29	Estimating speed of moving objects	54
27	Body balance	54
17	Touch	53
26	Body movement sensing	49
7	Mechanical devices	48
22	Depth perception	45
21	Far visual differentiation	41
23	Color perception	39
Dimension J1-2: Evaluation of Sensory Input		
30	Estimating speed of processes	68
33	Estimating quantity	63
35	Estimating time	60
31	Judging condition/quality	57
13	Events or circumstances	56
12	Behavior	55
34	Estimating size	44
29	Estimating speed ot moving objects	39
32	Inspecting	38
26	Body movement sensing	36
14	Art or decor	30
9	Materials not in process	30
Dimension J1-3: Visual Input from Devices/Materials		
6	Measuring devices	65
8	Materials in process	63
4	Patterns/related devices	58
32	Inspecting	55
3	Pictorial materials	52
9	Materials not in process	46
7	Mechanical devices	46

Table 2 (cont.)

Job Dimensions		Rotated Loading[a]
Dimension J1-3 (cont.):		
28	Estimating speed of moving parts	41
22	Depth perception	39
34	Estimating size	38
17	Touch	35
20	Near visual differentiation	30
Dimension J1-4: Input from Representational Sources		
1	Written materials	81
2	Quantitative materials	74
15	Verbal sources	66
3	Pictorial materials	51
35	Estimating time	40
20	Near visual differentiation	38
12	Behavior	36
Dimension J1-5: Environmental Awareness		
10	Features of nature	76
11	Man-made features of the environment	74
21	Far visual differentiation	58
34	Estimating size	49
22	Depth perception	45
27	Body Balance	44
14	Art or decor	39

[a]Loadings below 30 not reported

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Dimension J1-1: Perceptual Interpretation. This dimension accounted for 15.5% of the variance. It is a relatively broad dimension characterized primarily by job activities which require the sensing and interpretation of job information which is obtained through various of the human sense modalities (i.e., vision, hearing, touch, etc.).

Dimension J1-2: Evaluation of Sensory Input. This dimension accounted for 10.1% of the variance. It is characterized primarily by job activities which require the evaluation of information perceived through the various senses. Thus, in contrast to the previous dimension, this dimension is more concerned with the evaluation of information than it is with the interpretation of that information.

Dimension J1-3: Visual Input from Devices/Materials. This dimension accounted for 9.6% of the variance. It is characterized primarily by job activities which require the use of the sense of vision for the obtaining of job-related information. In addition, such information is, in general, obtained from devices or materials which are used on the job (in contrast to information which is obtained from such sources as natural features of the environment or the behavior of people).

Dimension J1-4: Input from Representational Sources. This dimension accounted for 7.9% of the variance. It is characterized primarily by job activities which require obtaining information from what might be termed "indirect sources." Such sources include written and pictorial material, but are not limited solely to such sources.

Dimension J1-5: Environmental Awareness. This dimension accounted for 8.7% of the variance. It is characterized primarily by types of job-related information which are obtained from features of the indoor or outdoor environment, where such features are generally at some distance from the observer. The use of information obtained from the sense of balance also enters into this dimension.

Components Resulting from the Analysis of the Job Elements in PAQ Division 2--Mental Processes

The principal components solution of the 13 job element correlation matrix computed using the job elements in the Mental Processes division of the PAQ (job elements 36-49) yielded a total of 2 principal components which accounted for 61% of the variance. The job elements receiving substantial loading on these dimensions are reported in Table 3. The interpretations associated with the various dimensions reported in Table 3 are given below.

Dimension J2-6: Decision Making. This dimension accounted for 38.1% of the variance. It is characterized by job activities which require the use of information in the making of decisions. At the lower end of the dimension, however, several PAQ job elements which entail a more simplified use of information (compiling and coding/decoding) are found.

Dimension J2-7: Information Processing. This dimension accounted for 23.3% of the variance. It is characterized primarily by job activities which entail the processing of job-related information in various ways (e.g., coding, compiling, analyzing, etc.).

Table 3

Job Dimensions Based on Component Analysis of Job Analysis Data: PAQ Division 2--Mental Processes

	Job Dimensions	Rotated Loading[a]
Dimension J2-6: Decision Making		
37	Reasoning in problem solving	79
47	Job-related experience	78
36	Decision making	76
48	Training	76
38	Amount of planning/scheduling	75
49	Using mathematics	70
46	Education	69
40	Analyzing information	63
39	Combining information	57
41	Compiling	46
42	Coding/decoding	30
Dimension J2-7: Information Processing		
43	Transcribing	78
41	Compiling	70
42	Coding/decoding	63
39	Combining information	59
45	Short-term memory	55
40	Analyzing information	53
37	Reasoning in problem solving	37
46	Education	36
38	Amount of planning/scheduling	35
49	Using mathematics	34
36	Decision making	31

[a] Loadings below 30 not reported

Components Resulting from the Analysis of the Job Elements in PAQ Division 3--Work Output

The principal components solution of the 48 job element correlation matrix computed using job elements in the Work Output division of the PAQ (job elements 50-98) yielded a total of 7 principal components which accounted for 55% of the variance. The job elements receiving substantial loadings on these dimensions are reported in Table 4. The interpretations associated with the various dimensions reported in Table 4 are given below.

Dimension J3-8: Manual/Control Activities. This dimension accounted for 11.4 % of the variance. It is characterized primarily by job activities in which tools or equipment are controlled, or in which various manual types of activities are performed. The tools and equipment referred to in this dimension are primarily those which may be operated or guided by hand, and they may be powered or non-powered.

Dimension J3-9: Physical Coordination in Control/Related Activities. This dimension accounted for 10% of the variance. It is characterized primarily by job activities which require the coordination of movement of various parts of the body or the coordination of various physical activities, as these are involved in the control of various types of equipment or machinery. The job elements which load the highest on this dimension seem to characterize activities which are required in the operation of vehicles of various sorts, but the dimension is also characterized by activities which related more to the coordination of movements in the performance of various other types of control tasks.

Dimension J3-10: General Body Activity versus Sedentary Activities. This dimension accounted for 8% of the variance, and is bipolar in nature. On the positively loaded side of this dimension are found various job activities and body postures which are associated with movement or bodily activity. On the negatively loaded side of the dimension are found various job activities which are more sedentary in nature.

Dimension J3-11: Manipulating/Handling Activities. This dimension accounted for 6.5% of the variance. It is characterized primarily by job activities which involve the movement of materials with the hands and arms, or which involve the manipulation of things with the fingers.

Dimension J3-12: Adjusting/Operating Machines/Equipment. This dimension accounted for 9.3% of the variance. It is characterized primarily by job activities involved in the operating or adjusting of machines or equipment.

Dimension J3-13: Skilled/Technical Activities. This dimension accounted for 5.5% of the variance. It is characterized primarily by job activities of a skilled or technical nature.

Table 4

Job Dimensions Based on Component Analysis of Job Analysis Data: PAQ Division 3--Work Output

	Job Dimensions	Rotated Loading[a]
Dimension J3-8:	Manual/Control Activities	
55	Powered nonprecision tools/instruments	-76
81	Assembling/disassembling	-74
51	Manually powered nonprecision tools/instruments	-71
54	Powered precision tools/instruments	-65
57	Applicators	-55
53	Handling devices/tools	-53
95	Hand-arm steadiness	-52
78	Setting up/adjusting	-48
58	Measuring devices	-43
50	Manually powered precision tools/instruments	-42
80	Material-controlling	-40
52	Long-handled tools	-40
94	Hand-arm manipulation	-38
79	Manually modifying	-37
76	Operating equipment	-36
87	Level of physical exertion	-35
72	Powered mobile equipment	-33
75	Man-moved mobile equipment	-33
92	Kneeling/stooping	-31
65	Keyboard devices	40
Dimension J3-9:	Physical Coordination in Control/Related Activities	
69	Continuous foot-operated controls	86
67	Frequent-adjustment foot-operated controls	82
68	Continuous hand-operated controls	73
71	Powered highway/rail vehicles	71
96	Eye-hand/foot coordination	62
72	Powered mobile equipment	43
86	Balancing	43
66	Frequent-adjustment hand-operated controls	37
63	Fixed setting controls	37
91	Climbing	36
52	Long-handle tools	34
97	Limb movement without visual control	34

Table 4 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension J3-9 (cont.)		
98	Hand-ear coordination	34
87	Level of physical exertion	33
85	Highly skilled body coordination	33
Dimension J3-10:	General Body Activity versus Sedentary Activities	
90	Walking-running	66
89	Standing	62
87	Level of physical exertion	56
92	Kneeling/stooping	53
91	Climbing	43
86	Balancing	42
52	Long-handle tools	40
84	Physical handling	35
75	Man-moved mobile equipment	31
85	Highly skilled body coordination	30
93	Finger manipulation	-38
65	Keyboard devices	-42
88	Sitting	-80
Dimension J3-11:	Manipulating/Hnadling Activities	
82	Arranging/positioning	66
97	Limb movement without visual control	57
84	Physical handling	54
79	Manually modifying	52
93	Finger manipulation	49
94	Hand-arm manipulation	46
80	Material controlling	44
83	Feeding/off-bearing	42
85	Highly skilled body coordination	41
98	Hand-ear coordination	38
95	Hand-arm steadiness	36
95	Eye-hand/foot coordination	31
Dimension J3-12:	Adjusting/Operating Machines/Equipment	
62	Activation controls	76
63	Fixed setting controls	74

Table 4 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension J3-12 (cont.):		
64	Variable setting controls	73
61	Machines/equipment	71
66	Frequent-adjustment hand-operated controls	63
78	Setting up/adjusting	58
83	Feeding/off-bearing	46
77	Remote-controlled equipment	42
76	Operating equipment	34
68	Continuous hand-operated controls	33
80	Materials controlling	32
Dimension J3-13: Skilled/Technical Activities		
59	Technical and related devices	73
56	Drawing and related devices	62
50	Manually powered precision tools/instruments	49
58	Measuring devices	48
93	Finger manipulation	45
95	Keyboard devices	39
98	Hand-ear coordination	30
54	Powered precision tools/instruments	30
Dimension J3-14: Use of Miscellaneous Equipment/Devices		
70	Man-powered vehicles	57
73	Powered water vehicles	57
72	Powered mobile equipment	49
74	Air/space vehicles	47
75	Man-moved mobile equipment	41
77	Remote-controlled equipment	39
76	Operating equipment	35
52	Long-handle tools	32

[a] Loadings below 30 not reported

Dimension J3-14: Use of Miscellaneous Equipment/Devices. This dimension accounted for 4.7% of the variance. An examination of the dimension scores of the jobs in the sample revealed that many of the jobs which loaded heavily on the dimension were concerned with the use of various types of equipment or devices. Although some of the PAQ job elements dealing with the use of non-highway vehicles loaded heavily on this dimension, this dimension is characterized primarily by the general control of various types of equipment and devices.

Components Resulting from the Analysis of the Job Elements in PAQ Division 4--Relationships With Other Persons

The principal components solution of the 35 job element correlation matrix computed using job elements in the Relationships With Other Persons division of the PAQ (job elements 99-134) yielded a total of 6 principal components which accounted for 57% of the variance. The job elements receiving substantial loadings on these dimensions are reported in Table 5. The interpretations associated with the various dimensions reported in Table 5 are given below.

Dimension J4-15: Interchange of Ideas/Judgments/Related Information. This dimension accounted for 23.9% of the variance. It is characterized primarily by job-related types of communication which involve the exchange of ideas, judgments, etc. A number of different types of individuals with whom this information is exchanged are also reflected in this dimension, and, in this regard, these people generally hold staff, managerial, or professional types of positions.

Dimension J4-16: Supervisory/Staff Activities. This demension accounted for 8.6% of the variance. It is characterized both by information exchange of a supervisory nature, and by interchanges of information among staff members.

Dimension J4-17: Public/Related Personal Contact. This dimension accounted for 7.4% of the variance. It is characterized primarily by job activities which involve contact with the public or other persons outside the orgaization, such as in selling, dealing with special interest groups, etc. It does, however, include certain types of contact with persons within the organization itself.

Dimension J4-18: Communicating Instructions/Directions/Related Job Information. This dimension accounted for 5.9% of the variance. It is characterized primarily by communication activities which involve the communication of instructions, directions, and related job information. These instructions or directions may be either supervisory or informational in nature.

Dimension J4-19: General Personal Contact. This dimension accounted for 5.8% of the variance. It is characterized by various types of personal communication. A review of the job dimension scores of the jobs in the sample for this dimension revealed that the types of

Table 5

Job Dimensions Based on Component Analysis of Job Analysis Data: PAQ Division 4--Relationships With Other Persons

	Job Dimensions	Rotated Loading[a]
Dimension J4-15:	Interchange of Ideas/Judgments/Related Information[b]	
105	Nonroutine information exchange	76
116	Professional personnel	75
133	Staff functions	74
114	Middle management/staff personnel	73
107	Writing	72
99	Advising	71
113	Executive/official	69
101	Persuading	68
100	Negotiating	67
117	Semiprofessional personnel	66
106	Public speaking	58
103	Interviewing	56
132	Coordinates activities	56
102	Instructing	54
120	Sales personnel	53
121	Buyers	52
134	Supervision received	51
118	Clerical personnel	49
125	Clients/patients/counselees	41
112	Job-required personal contact	40
115	Supervisors	37
124	Students/trainees/apprentices	35
126	Special interest groups	34
Dimension J4-16:	Supervisory/Staff Activities	
130	Total number of personnel for whom responsible	84
128	Supervision of nonsupervisory personnel	78
129	Direction of supervisory personnel	70
103	Interviewing	41
102	Instructing	36
106	Public speaking	32
99	Advising	31
123		30

Table 5 (cont.)

Job Dimensions		Rotated Loading[a]
Dimension J4-17: Public/Related Personal Contact		
122	Public customers	75
120	Sales personnel	57
126	Special interest groups	49
123	The public	49
125	Clients/patients/counselees	45
121	Buyers	45
101	Persuading	31
119	Manual and service workers	30
118	Clerical personnel	30
Dimension J4-18: Communicating Instructions/Directions/ Related Job Information		
108	Signaling	70
119	Manual and service workers	57
124	Students/trainees/ apprentices	56
102	Instructing	41
115	Supervisors	38
117	Semiprofessional personnel	35
Dimension J4-19: General Personal Contact[b]		
110	Entertaining	-65
111	Serving/catering	-56
131	Supervises nonemployees	-51
109	Code communications	-49
106	Public speaking	-33
123	The public	-32
126	Special interest groups	-31
Dimension J4-20: Job-Related Communications		
104	Routine information exchange	67
118	Clerical personnel	52
109	Manual and service workers	51
112	Job-required personal contact	49
115	Supervisors	41

[a] Loadings below 30 not reported

[b] All job element loadings on this dimension were negative

communication involved in the dimension were quite broad in terms of content, and, hence, the dimension was given a relatively non-specific title.

Dimension J4-20: Job-Related Communications. This dimension accounted for 5.8% of the variance. It is characterized by relatively routine types of job-related communications, involving primarily non-managerial types of employees.

Components Resulting from the Analysis of the Job Elements in PAQ Division 5--Job Context

The principal components solution of the 19 job element correlation matrix computed using job elements in the Job Context Division of the PAQ (job elements 135-153) yielded a total of 3 principal components which accounted for 54% of the variance. The job elements receiving substantial loadings on these dimensions are reported in Table 6. The interpretations associated with the various dimensions reported in Table 6 are given below.

Dimension J5-21: Potentially Stressful/Unpleasant Environment. This dimension accounted for 17.9% of the variance. It is characterized primarily by physical conditions in the job environment which may be unpleasant, thus leading to the potential for stress on the employee.

Dimension J5-22: Potentially Hazardous Job Situations. This dimension accounted for 18.5% of the variance. It is characterized primarily by job situations which carry the possibility of physical injury to the employee while he is performing his job.

Dimension J5-23: Personally Demanding Situations. This dimension accounted for 17.7% of the variance. It is characterized primarily by job demands which are in the nature of personal sacrifices. Included in the dimension are job situations which can lead to frustration on the part of the worker, or conflict among workers.

Components Resulting from the Analysis of the Job Elements in PAQ Division 6 (excluding dichotomous items)--Other Job Characteristics

The principal components solution of the 18 job element correlation matrix computed using the non-dichotomous job elements in the Other Job Characteristics division of the PAQ (job elements 169-187) yielded a total of 3 principal components which accounted for 51% of the variance. The job elements receiving substantial loadings on these dimensions are reported in Table 7. The interpretations associated with the various dimensions reported in Table 7 are given below.

Dimension J6-24: Attentive Job Demands. This dimension accounted for 23.1% of the variance. It is characterized primarily by job activities which require attentiveness and attention to detail on the part of the worker. Associated with this dimension are also a number of job elements whichdeal with the degree of responsibility associated with the job.

Table 6

Job Dimensions Based on Component Analysis of Job Analysis Data:
PAQ Division 6--Other Job Characteristics
(Excluding dichotomous items)

	Job Dimensions	Rotated Loading[a]
Dimension J6-24:	Attentive Job Demands[b]	
180	Updating job knowledge	79
179	Working under distractions	73
185	General responsibility	73
174	Precision	68
175	Attention to detail	66
187	Criticality of position	66
173	Time pressure of situation	65
186	Job structure	56
176	Recognition	33
Dimension J6-25:	Vigilant/Discriminating Work Activities[b]	
183	Responsibility for the safety of others	78
178	Vigilance: continually changing events	72
177	Vigilance: infrequent events	70
184	Responsibility for material assets	59
176	Recognition	55
182	Travel	33
Dimension J6-26:	Structured versus Unstructured Work Activities	
170	Repetitive activities	74
169	Specified work pace	70
172	Following set procedures	65
171	Cycled work activities	33
182	Travel	-31
186	Job structure	-47

[a]Loadings below 30 not reported

[b] All job element loadings on this dimension were negative

Table 7

Job Dimensions Based on Component Analysis of Job Analysis Data:
PAQ Division 6 -- Other Job Characteristics
(Dichotomous items)

	Job Dimensions	Rotated Loading[a]
Dimension J6-27:	Regular versus Irregular Work Schedule	
168	Typical day and night shift	81
164	Variable shift work	75
163	Regular hours	-82
166	Typical day hours	-82
Dimension J6-28:	Work/Protective versus Business Clothing	
156	Work Clothing	84
157	Protective clothing or gear	73
154	Business suit or dress	-81
Dimension J6-29:	Specific versus Non-Specific Clothing	
158	Informal attire	82
159	Apparel style optional	82
155	Specific uniform/apparel	-38
Dimension J6-30:	Continuity of Work Load	
161	Regular work	91
162	Irregular work	-89
Dimension J6-31:	Unnamed	
160	Licensing/certification required	70
155	Specific uniform/apparel	56
167	Typical night hours	53
165	Irregular hours	42

[a] Loadings below 30 not reported

Dimension J6-25: Vigilant/Discriminating Work Activities. This dimension accounted for 15.6% of the variance. It is characterized primarily by demands for vigilance which are placed on the worker, and also includes reference to a responsibility for the safety of others which is placed on the worker.

Dimension J6-26: Structured versus Unstructured Work Activities. This dimension accounted for 12.4% of the variance, and is bipolar in nature. The positively loaded side of this dimension is characterized primarily by job activities which are of a structured or repetitive nature, while the negatively loaded side of this dimension is characterized primarily by the lack of structure in a job. The bipolar nature of this dimension is, essentially an artifact of the nature of the scale used with PAQ job element #186, Job Structure. A job which is highly structured would be rated at the lower end of this scale, while one which is relativley unstructured would be rated at the high end of this scale. If this scale were reversed, this dimension would, most likely, not have been bipolar.

Components Resulting from the analysis of the Dichotomous Job Elements in PAQ Division 6--Other Job Characteristics

The principal components solution of the 15 job element correlation matrix computed using only the dichotomous job elements in the Other Job Characteristics division of the PAQ (job elements 154-168) yielded a total of 5 principal components which accounted for 63% of the variance. The job elements receiving substantial loadings on these dimensions are reported in Table 8. The interpretations associated with the various dimensions reported in Table 8 are given below.

Dimension J6-27: Regular versus Irregular Work Schedule. This dimension accounted for 18% of the variance, and is bipolar in nature. The positively loaded side of this dimension is characterized primarily by day to day work schedules which are irregular in nature, while the negatively loaded side of this dimension is characterized primarily by work schedules which are regular in nature. These regular schedules are frequently normal daytime business hours.

Dimension J6-28: Work/Protective versus Business Clothing. This dimension accounted for 13.4% of the variance, and is bipolar in nature. The positively loaded side of this dimension is characterized primarily by jobs in which normal work clothing and possibly some type of protective gear are worn, while the negatively loaded side of this dimension is characterized primarily by jobs in which a business suit or dress are worn.

Dimension J6-29: Specific versus Non-Specific Clothing. This dimension accounted for 10.3% of the variance, and is bipolar in nature. The positively loaded side of this dimension is characterized primarily by jobs or job situations which do not require that the worker wear any specific type of clothing, while the negatively loaded side of this

Table 8

Summary of Job Dimension Titles

Alphanumeric Label	Verbal Titles
	Job Dimensions Based on Job Data
J1-1	Perceptual Interpretation
J1-2	Evaluation of Sensory Input
J1-3	Visual Input from Devices/Materials
J1-4	Input from Representational Sources
J1-5	Environmental Awareness
J2-6	Decision Making
J2-7	Information Processing
J3-8	Manual/Control Activities
J3-9	Physical Coordination in Control/Related Activities
J3-10	General Body Activity versus Sedentary Activities
J3-11	Manipulating/Handling Activities
J3-12	Adjusting/Operating Machines/Equipment
J3-13	Skilled/Technical Activities
J3-14	Use of Miscellaneous Equipment/Devices
J4-15	Interchange of Ideas/Judgments/Related Information
J4-16	Supervisory/Staff Activities
J4-17	Public/Related Personal Contact
J4-18	Communicating Instructions/Directions/Related Job Information
J4-19	General Personal Contact
J4-20	Job-Related Communications
J5-21	Potentially Stressful/Unpleasant Environment
J5-22	Potentially Hazardous Job Situations
J5-23	Personally Demanding Situations
J6-24	Attentive Job Demands
J6-25	Vigilant/Discriminating Work Activities
J6-26	Structured versus Unstructured Work Activities
J6-27	Regular versus Irregular Work Schedule
J6-28	Work/Protective versus Business Clothing
J6-29	Specific versus Non-Specific Clothing
J6-30	Continuity of Work Load
J6-31	Unnamed
	Job Dimensions Based on Attribute Profile Data
A1-1	Visual Input from Devices/Materials
A1-2	Evaluation of Visual Input
A1-3	Perceptual Input from Processes/Events
A1-4	Verbal/Auditory Input/Interpretation
A1-5	Non-Visual Input

Table 8 (cont.)

Alphanumeric Label	Verbal Titles
	Job Dimensions Based on Attribute Profile Data
A2-6	Use of Job-Related Knowledge
A2-7	Information Processing
A3-8	Manual Control/Coordination Activities
A3-9	Control/Equipment Operation
A3-10	General Body/Handling Activities
A3-11	Use of Foot Controls
A4-12	Interpersonal Communications
A4-13	Signal/Code Communications
A4-14	Serving/Entertaining
A5-15	Unpleasant Physical Environment
A5-16	Personally Demanding Situations
A5-17	Hazardous Physical Environment
A6-18	Work Schedule I
A6-19	Job Responsibility
A6-20	Routine/Repetitive Work Activities
A6-21	Attentive/Discriminating Work Demands
A6-22	Work Attire
A6-23	Work Schedule II

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dimension is characterized by jobs or job situations in which the worker typically wears some specific type of uniform or apparel.

Dimension J6-30: Continuity of Work Load. This dimension accounted for 11.5% of the variance, and is bipolar in nature. The positively loaded side of this dimension is characterized by job situations which are regular in terms of the work load, while the negatively loaded side of this dimension is characterized by job situations in which there is some irregularity in the work load or some degree of seasonal fluctuation.

Dimension J6-31: Unnamed. This dimension accounted for 10% of the variance. It was left unnamed as the job elements which loaded significatly on this dimension did not appear to describe any type of job situation in particular. This dimension was, therefore, not used in the job component validation study which will be explained shortly, and it is recommended that this dimension not be used in future applications of these dimensions.

Components Resulting from the General or Overall Analysis Using All of the PAQ Job Elements

The principal components solution of the 168 job element correlation matrix computed using all of the job elements except the dichotomous ones, yielded a total of 14 principal components which accounted for 54% of the variance. (This analysis actually resulted in the identification of 27 components. Only 14 of these were actually used, however.) The job elements receiving substantial loadings on these dimensions are reported in Table 9. The interpretations associated with the various dimensions reported in Table 9 are given below.

Dimension JG-1: Decision/Communication/Social Responsibilities. This dimension accounted for 15.2% of the variance, and is a very broad dimension which indludes a large number of job elements. It is characterized primarily by job activities which are oriented toward decisions, communications, supervision, and various types of social contact with other persons. This dimension is dominated by many types of activites which are not of a routine nature, and in which the job incumbent is called upon to use such faciltites as reasoning, analyzing information, writing, etc.

Dimension JG-2: Environmental Demands/General Body Control. This dimension accounted for 5.1% of the variance, and is also somewhat broad in scope. It is characterized primarily by various types of environmental conditions present on a job, and by physical postures or activities which require the control or coordination of various parts of the body.

Dimension JG-3: Equipment/Machine Operation. This dimension accounted for 5.8% of the variance. It is characterized primarily by job activities which are involved in the operation or control of miscellaneous types of machines, equipment, devices, etc. Included among the activities which characterize this dimension are such things as the use of equipment controls, the monitoring of visual displays, and the use of various types of mechanical devices.

Dimension JG-4: Environmental Awareness. This dimension accounted for 5% of the variance, and is characterized primarily by job activities that involve awareness of environmental circumstances and events as they relate to job duties of various types. Although such awareness is relevant to the operation of controls, vehicles, etc., it is also relevant to a variety of other types of job activities.

Dimension JG-5: Manual Control Activities. This dimension accounted for 3.5% of the variance. It is characterized primarily by job activities which involve the use of tools, and by various physical skills required to do so. This dimension was so similar to dimension J3-8, which was explained previously, that it was given the same title as that dimension.

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Table 9

Job Dimensions Based on Component Analysis of Job Analysis Data: General Dimensions

	Job Dimensions	Roatated Loading[a]
Dimension JG-1:	Decision/Communication/Social Responsibilities	
37	Reasoning in problem solving	79
99	Advising	79
38	Amount of planning/scheduling	78
114	Middle management/staff personnel	78
101	Persuading	77
36	Decision making	76
107	Writing	76
105	Nonroutine information exchange	75
39	Combining information	74
40	Analyzing information	74
100	Negotiating	74
180	Updating job knowledge	74
185	General responsibility	74
46	Education	73
102	Instructing	71
113	Executives/officials	71
41	Compiling	70
186	Job structure	69
116	Professional personnel	67
149	Frustrating situations	67
103	Interviewing	65
49	Using mathematics	65
152	Inter-personal conflict situations	64
179	Working under distractions	64
112	Job-required personal contact	63
118	Clerical personnel	63
133	Staff functions	63
1	Written materials	62
117	Semiprofessional personnel	62
47	Job-related experience	60
106	Public speaking	60
150	Strained personal contacts	60
187	Criticality of position	60
15	Verbal sources	58
48	Training	58
12	Behavior	57
35	Estimating time	57
120	Sales personnel	57
124	Students/trainees/apprentices	56
134	Supervision received	54
2	Quantitative materials	53
132	Coordinates activities	52

Table 9 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension JG-1 (cont.):		
115	Supervisors	51
151	Personal sacrifice	51
173	Time pressure of situation	50
42	Coding/decoding	48
125	Clients/patients/counselees	48
130	Total number of personnel for whom responsible	48
56	Drawing and related devices	47
148	Civic obligations	47
126	Special interest groups	46
174	Precision	46
175	Attention to detail	46
121	Buyers	45
128	Supervision of nonsupervisory personnel	43
59	Technical and related devices	41
65	Keyboard devices	40
104	Routine information exchange	39
123	The public	39
184	Responsibility for material assets	38
178	Vigilance: continually changing events	37
3	Pictorial materials	36
43	Transcribing	36
45	Short-term memory	35
182	Travel	35
177	Vigilance: infrequent events	34
122	Public customers	33
13	Events or circumstances	32
31	Judging condition/quality	32
129	Direction of supervisory personnel	32
176	Recognition	32
33	Estimating quantity	31
Dimension JG-2: Environmental Demands/General Body Control		
141	Dirty environment	66
142	Awkward or confining space	66
138	Air contamination	62
136	High temperature--indoor	60
140	Improper illumination	60
27	Body balance	54
86	Balancing	54
91	Climbing	51
139	Vibration	49
52	Long-handled tools	46

Table 9 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension JG-2 (cont.):		
92	Kneeling/stooping	45
76	Operating equipment	41
87	Level of physical exertion	41
145	Temporary disability	41
26	Body movement sensing	40
137	Low temperature	40
146	Permanent partial impairment	40
147	Permanent total disability/death	40
108	Signaling	39
85	Highly skilled body coordination	38
144	First-aid cases	38
18	Odor	37
53	Handling devices	37
72	Powered mobile equipment	37
183	Responsibility for the safety of others	36
24	Sound pattern recognition	35
55	Powered nonprecision tools/instruments	34
135	Out-of-door environment	33
17	Touch	32
25	Sound differentiation	32
77	Remote controlled equipment	32
16	Nonverbal sounds	31
75	Man-moved mobile equipment	31
28	Estimating speed of moving parts	30
29	Estimating speed of moving objects	30
70	Man-powered vehicles	30
88	Sitting	-34
Dimension JG-3: Equipment/Machine Operation		
63	Fixed setting controls	76
62	Activation controls	75
64	Variable setting controls	73
5	Visual displays	67
66	Frequent adjustment hand-operated devices	64
16	Nonverbal sounds	60
61	Machines/equipment	59
24	Sound pattern recognition	58
78	Setting up/adjusting	58
7	Mechanical devices	55
28	Estimating speed of moving parts	53
25	Sound differentiation	51
77	Remote controlled equipment	46
68	Continuous hand operated controls	42
178	Vigilance: continually changing events	41
76	Operating equipment	39

Table 9 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension JG-3 (cont.):		
8	Materials in process	38
29	Estimating speed of moving objects	38
177	Vigilance: infrequent events	37
183	Responsibility for the safety of others	37
6	Measuring devices	36
54	Powered precision tools/instruments	36
17	Touch	35
83	Feeding/off-bearing	34
184	Responsibility for material assets	32
96	Eye-hand/foot coordination	31
98	Hand-ear coordination	31
18	Odor	30
22	Depth perception	30
51	Manually powered nonprecision tools/instruments	30
58	Measuring devices	30
Dimension JG-4: Environmental Awareness		
69	Continuous foot-operated controls	78
67	Frequent-adjustment foot-operated controls	73
71	Powered highway/rail vehicles	73
135	Out-of-door environment	70
68	Continuous hand operated controls	64
21	Far-visual differentiation	60
96	Eye-hand/foot coordination	56
10	Features of nature	54
11	Man-made features of the environment	48
182	Travel	44
22	Depth perception	43
72	Powered mobile equipment	42
123	The public	41
27	Body balance	40
86	Balancing	40
183	Responsibility for the safety of others	40
52	Long-handled tools	38
139	Vibration	38
91	Climbing	37
108	Signaling	37
147	Permanent total disability/death	36
146	Permanent partial impairment	35
29	Estimating speed of moving objects	34
34	Estimating size	33
145	Temporary disability	33
87	Level of physical exertion	32

Table 9 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension JG-4 (cont.):		
126	Special interest groups	30
66	Frequent-adjustment hand-operated devices	30
122	Public customers	30
Dimension JG-5:	Manual Control Activities	
81	Assembling/dissassembling	69
55	Powered nonprecision tools/instruments	61
51	Manually powered nonprecision tools/instruments	59
95	Hand-arm steadiness	54
54	Powered precision tools/instruments	53
79	Manually modifying	52
80	Material-controlling	47
94	Hand-arm manipulation	44
53	Handling devices/tools	43
57	Applicators	42
78	Setting up/adjusting	42
50	Manually powered precision tools/instruments	37
17	Touch	32
58	Measuring devices	30
Dimension JG-6:	Office/Related Activities	
93	Finger manipulation	59
65	Keyboard devices	57
43	Transcribing	51
88	Sitting	49
109	Code communications	47
97	Limb movement without visual control	46
442	Coding/decoding	41
56	Drawing and related devices	36
118	Clerical personnel	35
179	Working under distractions	35
41	Compiling	33
98	Hand-ear coordination	33
104	Routine information exchange	33
Dimension JG-7:	Evaluation of Sensory Input	
33	Estimating quantity	57
30	Estimating speed of processes	53
9	Materials not in process	49
34	Estimating size	48
13	Events or circumstances	42
32	Inspecting	42
35	Estimating size	41
31	Judging condition/quality	40
8	Materials in process	33
23	Color perception	33
11	Man-made features of the environment	30
17	Touch	30

Table 9 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension JG-8: General/Public-related Personal Contact		
110	Entertaining	46
19	Taste	43
106	Public speaking	43
125	Clients/patients/counselees	43
111	Serving/catering	42
126	Special interest groups	41
131	Supervises nonemployees	41
14	Art or decor	40
148	Civic obligations	37
123	The public	36
122	Public customers	33
116	Professional personnel	30
121	Buyers	30
Dimension JG-9: Use of Technical/Related Materials		
58	Measuring devices	60
6	Measuring devices	57
59	Technical and related devices	49
3	Pictorial materials	47
4	Patterns/related devices	43
49	Using mathematics	40
50	Manually powered precision tools/instruments	35
117	Semiprofessional personnel	32
Dimension JG-10: General Physical Activities versus Sedentary Activities[b]		
90	Walking/running	-56
75	Man-moved mobile equipment	-44
84	Physical handling	-43
82	Arranging/positioning	-39
171	Cycled work activities	-34
87	Level of physical exertion	-32
92	Kneeling/stooping	-30
88	Sitting	40
Dimension JG-11: Hazardous/Personally Demanding Situations[b]		
145	Temporary disability	63
146	Permanent partial impairment	61
144	First-aid cases	59
147	Permanent total disability/death	57
153	Non-job-required social contact	34
151	Personal sacrifice	31

Table 9 (cont.)

	Job Dimensions	Rotated Loading[a]
Dimension JG-12:	Attentive/Vigilant Work Activities[b]	
172	Following set procedures	49
176	Recognition	44
177	Vigilance: infrequent events	40
175	Attention to detail	37
174	Precision	32
178	Vigilance: continually changing events	31
Dimension JG-13:	Routine/Controlled Work Activities	
170	Repetitive activities	63
169	Specified work pace	58
83	Feeding/off-bearing	42
80	Materials controlling	33
Dimension JG-14:	Supervision/Coordination[b]	
130	Total number of personnel for whom responsible	64
128	Supervision of nonsupervisory personnel	58
129	Direction of supervisory personnel	57

[a] Loading below 30 not reported

[b] All job element loadings on this dimension were negative

Dimension JG-6: Office/Related Activities. This dimension accounted for 2.5% of the variance. It is characterized primarily by job activities which typically occur in an office type of situation. Some of these activities may be of a routine clerical nature. (It should be noted that this dimension was slightly bipolar in nature, with PAQ job element #89, Standing, receiving a loading of +41. This job element was not included in Table 9 for this dimension.)

Dimension JG-7: Evaluation of Sensory Input. This dimension accounted for 2.4% of the variance, and is characterized primarily by job activities which require the evaluation of various types of sensory input. The emphasis in this dimension is on the evaluation of the information, rather than on its mere perception.

Dimension JG-8: General/Public-related Personal Contact. This dimension accounted for 2.4% of the variance. It is characterized by general personal contact with other persons by the job incumbent, and, in particular, includes several job elements which deal with personal contact with the public or persons outside the organization.

Dimension JG-9: Use of Technical/Related Materials. This dimension accounted for 2.3% of the variance, and is characterized primarily by the use of various types of technical devices. The use of measuring devices and mathematics also characterizes this dimension.

Dimension JG-10: General Physical Activities versus Sedentary Activities. This dimension accounted for 1.6% of the variance, and is bipolar in nature. It is characterized on the negatively loaded side by job activities which are of a general physical nature, and which may involve the expenditure of physical energy. On the positively loaded side, this dimension is primarily characterized by job activities which are of a more sedentary nature.

Dimension JG-11: Hazardous/Personally Demanding Situations. This dimension accounted for 1.7% of the variance, and is characterized by the degree to which physical hazards are present in a job. Included in this dimension also are job requirements which may be of a "demanding" or "sacrifice" nature. This dimension is similar in many respects to both dimensions J5-22 and J5-23, which were explained previously.

Dimension JG-12: Attentive/Vigilant Work Activities. This dimension accounted for 1.7% of the variance. It is characterized by job activities or job demands which require the attention and vigilance of the job incumbent. This dimension is similar in some respects to both dimensions J6-24 and J6-25, which were explained previously.

Dimension JG-13: Routine/Controlled Work Activities. This dimension accounted for 1.8% of the variance, and is characterized by various job activities which are of a routine, repetitive nature. (It should be noted that this dimension was slightly bipolar in nature, with PAQ job element #18, Odor, receiving a loading of +30. Since this

loading was of such a marginal nature, this job element was not included in table 9 for this dimension.)

Dimension JG-14: Supervision/Coordination. This dimension accounted for 1.4% of the variance, and involves the supervision or coordination of activities of other persons. The job elements which loaded significantly on this dimension were those which indicate the numbers of people who are supervised or directed by the job incumbent.

Table 10

Summary of Job Dimension Titles[a]

Job Dimensions Based on Job Data		Job Dimensions Based on Attribute Profile Data	
	Division 1: Information Input		
J1-1	Perceptual Interpretaion	A1-1	Visual Input from Devices/Materials
J1-2	Evaluation of Sensory Input	A1-2	Evaluation of Visual Input
J1-3	Visual Input from Devices/Materials	A1-3	Perceptual Input from Processes/Events
J1-4	Input from Representaional Sources	A1-4	Verbal/Auditory Input/Interpretation
J1-5	Environmental Awareness	A1-5	Non-Visual Input
	Division 2: Mental Processes		
J2-6	Decision Making	A2-6	Use of Job-Related Knowledge
J2-7	Information Processing	A2-7	Information Processing
	Division 3: Work Output		
J3-8	Manual/Control Activities	A3-8	Manual Control/Co-ordination Activities
J3-9	Physical Coordination in Control/Related Activities	A3-9	Control/Equipment Operation
J3-10	General Body Activity versus Sedentary Activities	A3-10	General Body/Handling Activities
J3-11	Manipulating/Handling Activities	A3-11	Use of Foot Controls
J3-12	Adjusting/Operating Machines/Equipment		
J3-13	Skilled/Technical Activities		
J3-14	Use of Miscellaneous Equipment/Devices		
	Division 4: Relationships with Other Persons		
J4-15	Interchange of Ideas/Judgments/ Related Information	A4-12	Interpersonal Communi-cations
J4-16	Supervisory/Staff Activities	A4-13	Signal/Code Communications
J4-17	Public/Related Personal Contact	A4-14	Serving/Entertaining
J4-18	Communicating Instructions/Directions/Related Job Information		
J4-19	General Personal Contact		
J4-20	Job-Related Communications		

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Table 10 (cont.)

Job Dimensions Based on Job Data		Job Dimensions B Attribute Profile Data	
	Division 5: Job Context		
J5-21	Potentially Stressful/Unpleasant Environment	A5-15	Unpleasant Physical Environment
J5-22	Potentially Hazardous Job Situations	A5-16	Personally Demanding Situations
J5-23	Personally Demanding Situations	A5-17	Hazardous Physical Environment
	Division 6: Other Job Characteristics		
J6-24	Attentive Job Demands	A6-18	Work Schedule I
J6-25	Vigilant/Discriminating Work Activities	A6-19	Job Responsibility
J6-26	Structured versus Unstructured Work Activities	A6-20	Routine/Repetitive Work Activities
J6-27	Regular versus Irregular Work Schedule	A6-21	Attentive/Discriminating Work Demands
J6-28	Work/Protective versus Business Clothing	A6-22	Work Attire
J6-29	Specific versus Non-Specific Clothing	A6-23	Work Schedule II
J6-30	Continuity of Work Load		
J6-31	Unnamed		

[a] The dimensions based on job data and on attribute profile data are arranged by PAQ division in parallel columns for comparative purposes. Within any given division there may be dimensions based on the two sources which may be identical, or nearly so. However, the ordering and numbering of dimensions within each division is not intended to reflect corresponding dimensions.

DISCUSSION

This study was concerned with the identification of the dimensions underlying the job elements of the Position Analysis Questionnaire (PAQ), Form B, a structured job analysis questionnaire developed by McCormick, Jeanneret, and Mecham (1969), and was a part of a continuation of a line of research which has been pursued by McCormick and his students for the past decade or so. The major hypothesis that has guided this line of research is that there is an underlying structure to the world of human work that can be identified and quantified, and that this structure could be useful in connection with various personnel-related problems. This hypothesis has been generally confirmed by previous work, and in particular by previous work with Form A of the PAQ, the predecessor to the present Form B. (See, for example, Jeanneret and McCormick, 1969.)

The 45 job dimensions which were identified might by viewed as representing groups of job elements which tend to occur together on jobs (hence the reference to the structure underlying the world of human work), and, since the sample upon which these analyses were performed was stratified in proportion to the occupational composition of the labor force, these job dimensions should be relatively representative of the groupings of such job characteristics of jobs in general. This is especially important if such job dimensions are to have generality beyond the specific sample from which they were derived. To the extent that the sample is not representative, the generality of the job dimensions resulting from the analyses might be limited. In the present situation, the stratification of the sample to approximate the major occupational categories of the labor force, combined with the very large size of that sample(N = 3700), should serve to lend more credence to the results. In addition, the job dimensions which resulted from this study seemed, for the most part, to be logical, in that the job elements which loaded substantially on any given job dimension seemed to form recognizable combinations of work characteristics. This would also tend to lend credence to the proposition that these job dimensions characterize or tap the structure underlying the domain of work.

Since previous work with the PAQ has shown that job dimensions derived from PAQ-based data do have some practical utility in connection with various personnel type problems in organizations (Mecham and McCormick, 1969a, 1969b), it is expected that the job dimensions identified in the present study will also prove to be of practical utility. The utility of the present job dimensions was in part tested in a study to be reported in a following technical report, in which combinations of job dimension scores were used as the basis for estimation of the aptitude requirements of jobs. Certain other applications of the present job dimensions are also planned, and will be reported in subsequent technical reports.

CONCLUSIONS

The results of this study, in which the dimensions underlying the set of job elements which comprise the Position Analysis Questionnaire (PAQ) were identified, would seem to reconfirm the proposition that there is an order underlying the domain of human work. Because of the large size of this sample, and the fact that it was stratified in proportion to the occupational composition of the labor force, these job dimensions probably can be considered as reflecting relatively stable and representative aspects of the actual structure of the domain of human work. The 45 dimensions identified in this study accounted for a large portion of the variance associated with the data (51-63%). In general, these dimensions seemed to be logical and reasonable, in that the job elements which loaded substantially on any given dimension seemed to form recognizable combinations of work elements.

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